Falco peregrinus

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INTRODUCTORY

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AUTHORSHIP AND CITATION:
Luensmann, Peggy. 2010. Falco peregrinus. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2017, July 28].

FEIS ABBREVIATION:
FAPE

COMMON NAMES:
peregrine falcon
duck hawk

TAXONOMY:

The scientific name of peregrine falcon is *Falco peregrinus* Tunstall [6,7,54] (Falconidae) [54]. Subspecies in North America include [6,54]:

Falco peregrinus anatum Bonaparte, American peregrine falcon
Falco peregrinus pealei Ridgway, Peale's peregrine falcon
Falco peregrinus tundrius C.M. White, arctic peregrine falcon

SYNONYMS:
None

ORDER:
Ciconiiformes (formerly Falconiformes)

CLASS:
Bird

DISTRIBUTION AND OCCURRENCE

SPECIES: Falco peregrinus

GENERAL DISTRIBUTION:
The peregrine falcon is global in distribution [6,27]. General ecosystem types in which peregrine falcon occurs include arctic tundra, tropical ecosystems, deserts, wetlands, grasslands, mountainous regions, continental forests, maritime islands, and urban areas (review by [190]). In North America, the peregrine falcon's range extends from western Alaska to southern Greenland and south into Mexico ([6], review by [190]). Globally, peregrine falcons breed up to 75 °N latitude [27]. Peregrine falcons were reintroduced in many urban areas during recovery efforts by the US Fish and Wildlife Service and other organizations. NatureServe provides a distributional map of the peregrine falcon in North and South America.

All 3 North American subspecies occur in Alaska. Arctic peregrine falcons are found in the northern tundra, American peregrine falcons occur in the interior boreal forests, and Peale's peregrine falcons occur along southern coastal Alaska and the Aleutian Islands [5]. The 3 centers of highest breeding density in Alaska occur in the inland foothill tundra of the arctic slopes, the interior Yukon River system including delta regions and high mountain drainages, and the Alaska peninsula-Aleutian Islands region [27].

PLANT COMMUNITIES:

Alaska: Clifftops habitats along the Colville River are overgrown with dense thickets of alder (*Alnus* spp.) and willow (*Salix* spp.). Mixed spruce-quaking aspen (*Picea* spp.-*Populus tremuloides*) forests with prickly rose (*Rosa acicularis*) characterize cliff brinks on the Yukon River [27]. In Alaskan tundra, peregrine falcons hunt in wet tussock-heath (Ericacea) with many small lakes and sedge-grass (Cyperacea-Poacea) marshes. Drier areas with similar vegetation are also commonly used [191].

Pacific Northwest: In western Washington, peregrine falcons hunt birds along beaches, low dunes, and surrounding areas with Sitka spruce (*P. sitchensis*), shore pine (*Pinus contorta* var. *contorta*), California wax-myrtle (*Myrica californica*), and European beachgrass (*Ammophila arenaria*), particularly in winter [23].

In Washington and Oregon, peregrine falcons occupy cliffs in relatively open habitats ranging from low-elevation grasslands to high-elevation pine (*Pinus* spp.) forests in all seral stages ([56,143] cited in [25]). Peregrine falcons are rarely seen in the shrub-steppe in southeastern Washington [117].

California: In coastal California, peregrine falcons inhabit coastal sage scrub communities that are associated with coastal dunes, perennial grasslands, annual grasslands, croplands, pastures, coast Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*)-hardwood forests, coastal oak (*Quercus* spp.) woodlands, montane hardwood woodlands, closed-cone pine-cypress (*Cupressus* spp.) woodlands, chamise-red shank (*Adenostoma fasciculatum-A. sparsifolium*) chaparral, and mixed-chaparral communities. Coastal sage scrub is vegetated with bush lupine (*Lupinus* spp.) and manycolored lupine (*L. versicolor*) on exposed, oceanside sites and coyote bush (*Baccharis pilularis*) on less exposed sites [47]. East of San Francisco Bay, peregrine falcons occupy cliffs and rocky areas in coastal sage scrub habitat on southwest-facing slopes. Dominant species include California sagebrush (*Artemisia californica*), Eastern Mojave buckwheat (*Eriogonum fasciculatum*), black sage (*Salvia mellifera*), and snakeweed (*Gutierrezia* spp.) [117].

According to Verner and Boss [180], optimal habitat for peregrine falcons (based on high breeding density or use of a defined area) is not available in the Sierra Nevada. However, suitable habitat (intermediate density or use) is available there. Suitable breeding, foraging, and resting habitats in the Sierra Nevada include gray pine (*Pinus sabiniana*)-oak woodland, chaparral, Pacific ponderosa pine (*P. ponderosa* var. *ponderosa*) forest, mountain meadow, riparian deciduous woodland, and mixed-conifer associations in spring, summer, and fall [180]. Blue oak (*Q. douglasii*) savannas of the western Sierra Nevada [118,180] and Jeffrey pine (*P. jeffreyi*) associations provide suitable foraging and resting habitat in spring and fall. Low- and midelevation riparian deciduous woodlands as well as wet and dry mountain meadows provide suitable habitat for the peregrine falcon in the Sierra Nevada. Annual grasslands, California red fir (*Abies magnifica*), Sierra lodgepole pine (*P. c.* var. *murrayana*), and high-elevation riparian deciduous woodlands provide marginal breeding habitat (area used regularly, but does not play a major role in maintaining the population) for peregrine falcons. Peregrine falcons do not generally forage in associations with canopy cover ≥70% in the Sierra Nevada. They utilize all seral stages of forested, woodland, and chaparral habitats in the Sierra Nevada [180]. However, late-seral stages of chaparral may reduce prey availability [113]. Peregrine falcons likely occur in redwood (*Sequoia sempervirens*) and giant sequoia (*Sequoiadendron giganteum*) associations [53,196].

Dominant plants in riparian areas of southern California deserts where peregrine falcons may occur [135] include white burrobrush (*Hymenoclea salsola*) [91,98], cattle saltbush (*Atriplex polycarpa*), desert rabbitbrush (*Chrysothamnus paniculatus*), catclaw acacia (*Acacia greggii*) [98], desert trumpet (*Eriogonum inflatum*), desert stingbush (*Eucnide urens*), valley ringstem (*Anulocaulis annulatus*), Arizona honeysweet (*Tidestromia oblongifolia*), spurge (*Euphorbia* spp.), Schott's pygmy-cedar (*Peucephyllum schottii*), sweetbush (*Bebbia juncea*), and Parry's wirelettuce (*Stephanomeria parryi*) [91].

Intermountain West and Rocky Mountains: In the western United States, peregrine falcons likely occur in singleleaf pinyon-juniper (*P. monophylla-Juniperus* spp.), ponderosa pine, Rocky Mountain Douglas-fir (*Pseudotsuga menziesii* var. *glauca*), and spruce-fir (*Abies* spp.) associations [53,196]. Hejl and others [83], however, suggested peregrine falcons are rare in pinyon-juniper and pine-oak woodlands and in ponderosa pine, Rocky Mountain Douglas-fir-dominated mixed-conifer, Rocky Mountain lodgepole pine (*Pinus contorta* var. *latifolia*), and quaking aspen forests in the Rocky Mountains. Peregrine falcons may occasionally use clearings in Engelmann spruce-subalpine fir (*P. engelmannii-A. lasiocarpa*) forests for foraging [161].

In Idaho, peregrine falcons occupy the Middle Rocky Mountains, which occurs on the eastern border of Idaho ([97,176] cited in [18]). Forest types include Rocky Mountain Douglas-fir, Engelmann spruce-subalpine fir, and quaking aspen habitats, with sagebrush (*Artemisia* spp.) and antelope bitterbrush (*Purshia tridentata*) steppes and mountain meadows at lower elevations ([176] cited in [18]). Peregrine falcons are occasional visitors in shrublands and grasslands. Shrublands with peregrine falcons include big sagebrush (*A. tridentata*), low sagebrush (*Artemisia* spp.), gray horsebrush-green rabbitbrush-(*Tetradymia canescens-C. viscidiflorus*)-big sagebrush, green rabbitbrush-

big sagebrush-grass, Gardner's saltbush-winterfat-Indian ricegrass (*A. gardneri-Krascheninnikovia lanata-Achnatherum hymenoides*) types and a mixed-shrub vegetation type that is restricted to lava flows. Grassland types include bluebunch wheatgrass-threetip sagebrush (*Pseudoroegneria spicata-A. tripartita*)-green rabbitbrush, western wheatgrass-povertyweed-Baltic rush (*Pascopyrum smithii-Iva axillaris-Juncus balticus*), Indian ricegrass-green rabbitbrush-prickly-pear (*Opuntia* spp.), giant wildrye (*Leymus cinereus*)-green rabbitbrush-big sagebrush, and crested wheatgrass (*Agropyron cristatum*) communities [117].

Nest sites in Colorado are surrounded by cottonwood (*Populus* spp.)-willow, ponderosa pine/shrub, open willow-birch (*Betula* spp.) meadows, ponderosa pine-Rocky Mountain Douglas-fir, Rocky Mountain Douglas-fir-Engelmann spruce, Rocky Mountain Douglas-fir, Gambel oak-mountain mahogany-serviceberry (*Q. gambelii-Cercocarpus-Amelanchier* spp.) mountain brushlands, and singleleaf pinyon-juniper communities. Common associates included quaking aspen, white fir (*A. concolor*), and limber pine (*P. flexilis*) [59]. In northern Colorado, migrant peregrine falcons are common in xeric mixed grasslands dominated by wheatgrass (Triticeae), Canada bluegrass (*Poa compressa*), prairie Junegrass (*Koeleria macrantha*), threeawn (*Aristida* spp.), other perennial grasses, and forbs [117].

Desert Southwest: In Arizona, breeding sites may be found in a broad range of vegetation types from wetlands, riparian areas, and montane coniferous forests to Mohave and Sonoran desert scrub [57]. Peregrine falcons overwinter around the Colorado River Delta at the western edge of the Sonoran Desert [90]. Vegetation distribution in riparian areas of the Sonoran Desert is highly variable due to variation in summer and winter rainfall [135]. Historically, Fremont cottonwood-Goodding willow (*Populus fremontii-S. gooddingii*) woodlands were common in the Colorado River Delta. Upland terraces were vegetated with mesquite (*Prosopis* spp.) bosques. Marshlands associated with oxbows, backwaters, and seepages were common. More recently, cottonwood-willow woodlands covered a limited area, upland areas were developed for agriculture, and some marshlands were partially maintained by agricultural runoff [90]. Smoketree (*Psorothamnus spinosus*) is also a major shrub species along large drainages along the western edge of the Sonoran Desert. Desert ironwood (*Olneya tesota*) and blue paloverde (*Parkinsonia florida*) are locally dominant [135].

Permanent streams in the Great Basin Desert may be occupied by peregrine falcons. Streambanks are dominated by Fremont cottonwood, narrowleaf cottonwood (*P. angustifolia*), arroyo willow (*S. lasiolepis*), black willow (*S. nigra*), sandbar willow (*S. exigua*), and Goodding willow [135]. In Utah, Fremont cottonwood generally dominates in rivre canyons, while Colorado pinyon-Utah juniper (*P. edulis-J. osteosperma*) associations are dominant on cliff tops [27]. Eyries (nest sites) in southern Utah are associated with pinyon-juniper and deciduous riparian woodlands. These habitats support a diverse potential prey base [193]. Peregrine falcons are transient or irregularly seen in submontane Gambel oak shrub communities in Utah [111].

Peregrine falcons may occupy cliffs and hunt in wooded areas in New Mexico. Habitats within the New Mexico landscape include galleta grass (*Pleuraphis* spp.) and black grama (*Bouteloua eriopoda*) grasslands, oneseed juniper (*J. monosperma*)-Colorado pinyon woodlands, and club cholla (*Grusonia clavata*)-prickly-pear-soapweed yucca-fourwing saltbush (*Yucca glauca-A. canescens*) and rabbitbrush-Apache-plume (*Chrysothamnus* spp.-*Fallugia paradoxa*)-fourwing saltbush riparian scrublands [117]. Dominant vegetation in southwestern New Mexico includes cactus, agave (*Agave* spp.), prickly-pear, and sometimes dense cover of Gambel oak, gray oak (*Q. grisea*), silverleaf oak (*Q. hypoleucoides*), mountain-mahogany, Colorado pinyon, and alligator juniper (*J. deppeana*). In New Mexico, common vegetation in areas that had burned within 25 years included New Mexico locust (*Robinia neomexicana*) and currant (*Ribes* spp.). Between 5,000 and 8,000 feet (1,500-2,400 m) elevation, most cliffs in southwestern New Mexico were surrounded by interior ponderosa pine (*Pinus p.* var. *scopulorum*) and Rocky Mountain Douglas-fir on mesic slopes or by oak-juniper-pine scrublands on xeric slopes [69]. Peregrine falcons are rare summer visitors to sand shinnery oak (*Q. havardii*) and honey mesquite (*Prosopis glandulosa*) communities in southeastern New Mexico [10].

In the Chihuahuan Desert of New Mexico, vegetation along ridges and canyon rims includes pine and oak. Steep-sloped canyon walls support grasses and shrubs, including ocotillo (*Fouquieria splendens*), sotol (*Dasylirion* spp.), yucca (*Yucca* spp.), and lechuguilla (*Agave lechuguilla*). Streambeds are dominated by walnut (*Juglans* spp.), Mexican buckeye (*Ungnadia speciosa*), Texas madrone (*Arbutus xalapensis*), bigtooth maple (*Acer grandidentatum*), hackberry (*Celtis* spp.), alligator juniper, and oak [185]. Cottonwood and desert willow are found along primary drainages with associates such as screwbean mesquite (*P. pubescens*), honey mesquite, desert-thorn

(*Lycium* spp.), and saltbush. In secondary drainages, acacia, sensitive plant (*Mimosa* spp.), baccharis (*Baccharis* spp.), snakewood (*Condalia* spp.), and burrobrush are associated with desert willow and/or mesquite [135].

The low-desert landscape of the Chihuahuan Desert in Texas and north-central Mexico is dominated by creosotebush (*Larrea tridentata*), mesquite, acacia, and sensitive plant. Elevations at 3,600 to 4,600 feet (1,100-1,400 m) are vegetated with sotol scrub or shortgrass prairie. Juniper-oak communities are found at 4,600 to 5,600 feet (1,400-1,700 m). Pinyon-oak-juniper associations and coniferous forests including pine (*Pinus* spp.) and Rocky Mountain Douglas-fir occur at the highest elevations [94].

Great Plains: In Texas and Oklahoma, peregrine falcons are resident in sand shinnery oak communities [52]. Peregrine falcons are common on the Texas coast during migration. Occupied beach habitats are vegetated with little bluestem (*Schizachyrium scoparium*), saltmeadow cordgrass (*Spartina patens*), seashore dropseed (*Sporobolus virginicus*), and gulfdune paspalum (*Paspalum monostachyum*) ([195] cited in [95]).

Eastern United States: Primary habitat in eastern and central Kentucky cliff systems and valley slopes includes mixed-mesophytic and northern hardwood forests, including eastern hemlock-yellow-poplar-American beech (*Tsuga canadensis-Liriodendron tulipifera-Fagus grandifolia*) [39,55]. Sandstone outcrops forming ridges are characterized by oak-pine-hickory (*Carya* spp.) forest [55]. On ridgetops, dominant trees include pitch pine (*P. rigida*), shortleaf pine (*P. echinata*), Virginia pine (*P. virginiana*), chestnut oak (*Q. prinus*), and scarlet oak (*Q. coccinea*). Other associates include American basswood (*Tilia americana* var. *heterophylla*), sugar maple (*A. saccharum*), northern red oak (*Q. rubra*), white oak (*Q. alba*), yellow buckeye (*Aesculus flava*), and eastern hemlock [39].

Peregrine falcons inhabit 70- to 160-year-old, old-growth loblolly pine (*P. taeda*) stands with associated live oak (*Q. virginiana*) and laurel oak (*Q. laurifolia*) in maritime forests of South Carolina [84].

Peregrine falcons occupy the Florida sandhills region. Conifer types include longleaf pine-turkey oak (*P. palustris-Q. laevis*) and sand pine (*P. clausa*)-scrub oak associations. Scrub oak types may include Chapman oak (*Q. chapmanii*), myrtle oak (*Q. myrtifolia*), and sand live oak (*Q. geminata*) [112].

Eastern Canada: On Rankin Inlet, Nunavut, ridges, uplands, and well-drained slopes are dominated by lichens, mosses, and low shrubs including northern Labrador tea (*Ledum palustre*), mountain cranberry (*Vaccinium vitis-idaea*), and black crowberry (*Empetrum nigrum*). White arctic mountain heather (*Cassiope tetragona*) occurs in moist, low-lying areas and rock crevices. Heaths, entireleaf mountain-avens (*Dryas integrifolia*), sedges (*Carex* spp.), mountain heather (*Cassiope* spp.), and lichens are common on slopes and hillsides on Rankin Inlet ([115] cited in [45]).

The tundra of western Greenland is dominated by grayleaf willow (*S. glauca*) and dwarf birch (*Betula nana*) shrubs under 3 feet (1 m) in height, with associated crowberry (*Empetrum* spp.), Labrador tea (*Ledum* spp.), mountain heather, sedges, cottongrass (*Eriophorum* spp.), reedgrass (*Calamagrostis* spp.), fescue (*Festuca* spp.), and bluegrass (*Poa* spp.) [26,150]. In southern Greenland, habitat ranges from dense willow scrub to sparse vegetation including black crowberry, common juniper (*J. communis*), and scattered birch up to 26 feet (8 m) tall [67,68].

Mexico: In the Sierra Madre Oriental, plant communities surrounding cliffs utilized by peregrine falcons include southwestern white pine (*P. strobiformis*)-Rocky Mountain Douglas-fir-fir (*Abies* spp.) on ridges, dense pinyon-juniper forests, pinyon-juniper-yucca on hillsides, cornfields (*Zea mays*), fallow fields, and both young and mature paradise apple (*Malus pumila*) orchards [105]. In northern Sonora, a peregrine falcon was observed in a topographically complex area with patches of oak woodlands separated by desert grasslands or scrublands. Florida hopbush (*Dodonaea viscosa*), gumhead (*Gymnosperma glutinosum*), and sensitive plant dominated the area [70].

BIOLOGICAL DATA AND HABITAT REQUIREMENTS

SPECIES: Falco peregrinus

Peregrine falcon eyrie. Photo by US Fish and Wildlife Service.

LIFE HISTORY:

Distinguishing characteristics: Peregrine falcons are medium-sized diurnal raptors ([82], review by [190]). Of the North American falcons, they are 2nd in size only to gyrfalcons (*Falco rusticolus*) [27,54]. Peregrine falcons are sexually dimorphic (reviews by [162,190]). Females are generally 15% to 20% larger and 40% to 50% heavier than males (review by [190]). Typically, females average 26 to 49 ounces (750-1,398 g), while males average 18 to 35 ounces (500-994 g) [11,27,144,186]. Total length of females and males is 18 to 23 inches (45-58 cm) and 14 to 19 inches (36-49 cm), respectively. In the wild and in captivity, peregrine falcons may hybridize with prairie falcons (*F. mexicanus*) or gyrfalcons (review by [190]).

Phenology: Timing of migrations, courtship, and breeding appears to be influenced by local weather and prey availability [27,43,68,82]. Peregrine falcon migrations closely parallel the migrations and breeding cycles of waterfowl, shorebird, and songbird prey [1,27,49,68,82,187]. Observations suggest that arrival to nesting sites and breeding in arctic climates corresponds to the break up of river ice in spring [5,43,122].

Timing of major peregrine falcon breeding events						
Location	Arrival Date	Courtship/ Copulation	Eggs Laid	Hatching	Fledging	Departure Date
eastern Alaska	15 April	No data	No data	No data	No data	

						No data (Ambrose 2002 personal communication cited in a review by [190])
northern and interior Alaska	mid-May	No data	late May to early June	late June to late July (estimate)	early to late August (estimate)	late September or later (estimate) [27]
Yukon River, Alaska	mid-April	No data	11 May	No data	No data	No data ([5], Ambrose 2002 personal communication cited in a review by [190])
coastal southeastern Alaska and the Aleutian Islands	No data	No data	early April to early May	No data	15 June to 4 July	No data ([27,188], White 2002 personal observation cited in a review by [190])
southwestern Alaska	No data	No data	No data	12 June to 18 June (estimated means)	No data	No data [122]
Rankin Inlet, Nunavut	10-28 May	No data	1-25 June	9-15 July (estimate)	19-30 August (estimate)	Late September to early October [43,45]
Greenland (60-77 °N)	last half of May	No data	late May to early June	23 June to 19 July	1 August to 6 September	No data [68]
western Greenland	mid- to late May	No data	late June	No data	No data	late September ([26], Mattox 1983 unpublished report cited in [68])
southern Quebec	8-19 May	16 May to 7 June	No data	6 July (estimate)	10-17 August	19-27 September [15]
Langara Island, British Columbia (54 °N)	No data	No data	28 March to mid-April	6-25May	17 June to 5 July	No data [129,130]
San Juan Island, Washington (48 °N)	No data	No data	3-7 April	No data	No data	No data
Seattle, Washington (47 °N)	No data	No data	early to mid-March	No data	No data	No data (Anderson 2002 personal communication cited in a review by [190])
Los Padres NF, California	No data	28 February	9 April	19-20 April	23 May	No data [79]
northern California	No data	No data	May; replacement clutches laid until September	No data	No data	No data (Walton 2002 personal communication cited in a review by [190])
southern and central-coastal California (about 33-34 °N)	No data	No data	mid- to late February	No data	No data	No data (Linthicum and Walton 2002 personal communications cited in a review by [190])
Yosemite NP, California (>2,000 m elevation; 37 °50 'N)	No data	No data	late March to mid-April	No data	No data	No data (Lithicum 2002 personal communication cited in a review by [190])
southern California	No data	7 January		No data		No data [170]

			12 March to 26 April		18 May to 2 July	
Utah	No data	No data	22 March to mid-May	No data	No data	No data [140]
Colorado	late February to early March	No data	No data	mid- to late May	mid- to late June	No data [173]
Maryland	No data	No data	earliest record, approximately 12 February; typically late March to early April	No data	No data	No data [194]
Sierra Madre Oriental, Mexico	No data	late February to mid-March	No data	No data	No data	No data [105]

Peregrine falcons in northern California reproduced later than pairs in southern California, but the difference was negligible [170].

Migration: Timing of spring and fall migration is highly variable by location. According to a review of Indiana populations, spring migrations peak in April and May, while fall migrations peak in October [124]. Spring migration in central Alberta occurs from 20 April to 31 May. Spring migration of adult peregrine falcons in central Alberta peaks 8 May to 12 May, while immatures (under 2 years old) are primarily spotted from 15 May to 24 May [49]. Peregrine falcons that migrate to Florida typically arrive in September and leave in May [166]. Peregrine falcons overwintering in Brazil arrive from October to December and remain until March. Individuals observed in Brazil during late April are likely migrating from areas even farther south [1].

Peregrine falcons are considered solitary, long-distance migrants [45,160,187,190]. However, some fledgling siblings migrate together in fall, while other siblings migrate separately [27,116]. Many peregrine falcons spend the breeding season in North America and overwinter in South America [1]. Peregrine falcons banded in the Northern Territories are recovered throughout South America [197]. American and arctic peregrine falcons in arctic and subarctic regions of North America migrate as far south as Argentina and Chile, a distance of 7,500 miles (12,000 km) or more [4,8,85,156,186]. Some populations in both regions are year-round residents (review by [190]). In particular, populations at temperate latitudes and along coastal areas are largely resident or engage in short-distance winter movements [4,170,186]. For example, Peale's peregrine falcons are resident in coastal Alaska and the Aleutian Islands, with some short-distance movements through western Canada and the conterminous United States [ ]. Some adults on coastal British Columbia do not appear to migrate [129], while others may migrate up to 120 miles (200 km) [156].

During migration, peregrine falcons concentrate along defined routes. These routes include coastal areas of prime habitat (especially barrier islands) along the Eastern Seaboard, Gulf Coast, and eastern Mexico [17,146,197]. Peregrine falcons that nest in the northern United States, eastern Canada, and Greenland often migrate to Central America or the Caribbean [40,67,85,116,146]. Males originating in western Greenland tend to migrate farther south (to Central and South America) than females from western Greenland (to eastern United States and Caribbean) [146]. Yates and others [197] found that peregrine falcons banded on the east coast and the Gulf of Mexico coast did not always follow distinct migratory patterns. Peregrine falcons from the Gulf Coast were recovered in Central and South America or islands in the Caribbean [197]. Lesser concentrations of migrating peregrine falcons follow shores of the Great Lakes, the western coast of the United States and Mexico, and the Front Range of the Rocky Mountains [63,187]. In a review, White and others [190] suggested that migration routes used by adults may differ somewhat from immatures. Peregrine falcons banded throughout Canada and Alaska are recaptured in Texas, Iowa or other parts of the Midwest, Colorado [116,197], the eastern United States, and South America during migration [116,146,156,197]. Individuals banded in Wisconsin are recovered in other parts of the Midwest, Gulf Coast,

Caribbean islands, Central America, and northern South America [197]. In 2 unusual cases, peregrine falcons originally banded in Arizona and Texas migrated to Japan. Their migrations may have been assisted by ocean vessels (review by [190]). More specific migration information is available in chapters 44 to 49 in Cade and others [31] and in a review by White and others [190].

Few studies of migratory behavior had been completed as of 2009. Cochran [40] tracked an immature male peregrine falcon during fall migration for 15 days. The immature male on average spent 58% of the day perching or eating; 6% of the day in low hunting flight; 7.5 % of the day in low migratory flight; and 28.5% of the day in circling or soaring migratory flight. He engaged in nearly continuous migratory flight for 5 hours on average. Hunting occurred in the early morning before migratory flight and again in the evening following migratory flight. Hunting activity was rare during the migratory flight period [40].

Reproductive biology: Peregrine falcons are generally monogamous, often creating the same pair bond in successive years [27,130,190]. However, observations of 1 male providing food to 2 females have been documented (Telford and Linthicum 2002 personal communications cited in a review by [190], Weir 1993 personal communication cited in [144]). Cases where a single male breeds with 2 females may end in failure of at least 1 nest [144]. Several cases of pseudopolyandry (1 female occupies the territories of 2 males) have also been observed [128,130]. Observations of extra-pair breeding are rare. Multiparentage has been documented in which some or all offspring in a nest did not share genes with one or both parents. These cases could be a result of polyandry, intraspecific brood parasitism, or loss of a resident bird and replacement by another mate during breeding [99].

Most peregrine falcons begin breeding at 2 to 4 years old [99,119,130,140,144,172,190]. However, age of first breeding may be related to population density and nest site availability [5]. Age at first breeding can be highly variable within the same population. For instance, at Rankin Inlet, Nunavut, average age for males breeding for the first time was 4 years (range: 2-8 years), and for females, 3 years (range: 3-5 years) [99]. Yearling females breed more often than yearling males, but both sexes may successfully breed as yearlings [119,172,183]. However, yearlings are often unsuccessful during their first breeding attempts [42]. Yearling females generally lay fewer eggs than adult females [89].

Mean clutch size of 3 to 4 eggs is typical for peregrine falcons [27,45,79,80,88,144,170]. Clutches containing up to 6 eggs have been reported [80,89]. Little variation in average clutch size appears to exist from one locality to another. Uncharacteristically, an average clutch size of 2.54 eggs was reported for a study in western Mexico [139]. However, it is unknown if this low clutch size is typical for the region. The mean number of nestlings and fledglings produced per nesting pair in North America varies by location.

Nestlings and fledglings per nesting peregrine falcon pair by location					
Location	Timeframe	Mean # nestlings/ territorial pair	Mean # nestlings/ successful pair	Mean # fledglings/ territorial pair	Mean # fledglings/ successful pair
Alaska	1980-1985	1.3-3.0	2.3-3.3	No data	No data [4]
Alaska	1949-1952; 1956-1959	2.5	No data	0.5-1.5	No data [27]
Aleutian Islands, Alaska	1970-1972	No data	No data	1.77	2.66 [188]
Northwest Territories	1976-1985	2.0-2.21	2.2-2.94	No data	No data [22,35]
Rankin Inlet, Nunavut	1981-1986	2.79	No data	0.5-2.3	2.4-3.1 [43,45]
western Greenland	1981-1985	2.3-2.6	3.0	No data	No data [116]
inland western Greenland	1972-1981	1.80-2.88	2.25-3.25	No data	No data [26]
southern Greenland	1981-1985	2.5-3.2	No data	No data	No data [67]
Ungava Bay, Quebec	1980-1985	2.32-2.85	2.36-3.21	No data	No data [17]
Langara Island, British Columbia	1980-1989	1.60-3.33	2.00-3.33	No data	No data [128]
Langara Island, British Columbia	1968-1975	No data	No data	1.76	2.32 [130]

upper Midwest, southern Manitoba, and Ontario	1982-2000	2.0-2.4	2.7-2.7	No data	No data [171,172]
Idaho	1984	0	0	No data	No data
Wyoming	1985	3.0	3.0	No data	No data [62]
California	1975-1976	No data	No data	1.6-2.0	No data [170]
Utah	1985	1.2	2.0	No data	No data
Arizona	1976-1985	No data	No data	1.4-2.6	2.0-2.6 [58]
New Mexico	1984	2.2	2.9	No data	No data
Texas and north-central Mexico	1980-1985	0.2-1.5	1.0-3.0	No data	No data [94]
western Mexico	1976-1984	2.17	No data	1.74	No data [139]
Sierra Madre Occidental and Sierra Madre Oriental, Mexico	1975-1982	0.7-1.6	1.7-2.5	No data	No data [94,105]

One brood is produced per year (review by [190]). However, renesting may occur if all eggs or nestlings are lost after the initial attempt or disturbance causes the breeding pair to abandon the nest [86,89,144]. A different nesting site, often on the same cliff, is typically selected for renesting [138,144]. A pair in New Mexico chose the eyrie used the previous year when attempting to renest [138]. On average, replacement clutches may contain fewer eggs than the clutch laid first [89]. For example, initial clutches in California contained an average of 3.7 eggs/nest, while replacement clutches contained an average of 3.5 eggs/nest [170]. The short breeding season in the Arctic may reduce the possibility of a 2nd nesting attempt if the first clutch fails [89].

Nesting success in the same region is highly variable between sites and years [4,22,35]. Not all nestlings counted survive and fledge [17]. Peregrine falcons that breed at favorable sites tend to be more successful at fledging young [89].

The interval between each egg lain is approximately 48 to 72 hours. The interval between the 2nd-last and last egg is typically longest [27,140,144,190]. Incubation often does not begin until the 3rd egg is laid [144]. Incubation periods vary between 28 and 37 days [105,140,144,170]. Asynchronous hatching is common [27,45,140]. Age at fledging is 35 to 53 days [39,105,129,144,170]. Males may grow flight feathers 3 to 5 days before females. Females continue to grow during the nestling phase of development to ultimately reach a larger body size than males [11].

Both adults and young may remain at the eyrie for several months after fledging. Fledgling dependence may continue until migration (5-6 weeks after fledging) [27,158]. Nonmigratory peregrine falcons may have a dependency period of 9 to 10 weeks. Hacked peregrine falcons (those raised in captivity then released into the wild) disperse approximately 4 to 6 weeks after fledging, although later dispersals have been recorded [158]. Siblings may form hunting groups after fledging and before migration [27].

Weather appears to influence reproductive success for peregrine falcons [43,128]. Years with unusually low reproductive success are typically associated with cool, wet springs that reduce prey abundance or hinder hunting [132] and directly impact nestling survival [43]. Poor spring weather can delay the onset of nesting [45]. Peregrine falcon pairs may abandon breeding attempts in years of low food availability [93].

Breeding behavior: Copulation in northern latitudes is typically brief and occurs shortly after peregrine falcons arrive at their nesting area [5,27]. Courtship in southern latitudes may last up to several months before eggs are laid [27]. Breeding behavior has been observed for peregrine falcons overwintering in Brazil [1], but details on whether nesting actually occurred at this time were not provided.

Both the male and female incubate and brood the young, but the female has the larger responsibility for brood care [15,82,129,144]. Males generally take on most of the hunting and defense role while eggs and nestlings are present. Both sexes provide food for young, particularly when brooding is no longer required [82]. Limited cooperative breeding has been observed (review by [190]).

Nonterritorial peregrine falcons are common in some populations [45,99] and may breed with resident birds following the death of their mates [128,132]. After its death, a breeding territorial bird is often replaced within 24 to

40 hours by an unmated individual [78,89]. Occasionally, multiple females may be found at a nest. Such individuals may be young birds that have not yet bred [132].

Mortality: Wild and hacked peregrine falcons live up to 20 years [89,172,190]. Annual survival of breeding peregrine falcons is estimated at 63% to 100% for females and 50% to 89% for males [42,45,99,119,128,169,172], with considerable variation between study areas. On Langara Island, British Columbia, Nelson [127] determined that adult mortality increases after raising large broods. Annual mortality for peregrine falcons raising 3 to 4 young was higher (43%) than peregrine falcons raising 0 to 2 young (23%), suggesting that raising larger broods incurs a higher physical cost [127,128]. The opposite trend was observed in Rankin Inlet, Nunavut (Court 1988 personal communication cited in [127]), suggesting that adult rearing efforts vary between populations [127]. Population turnover rates in Colorado were likely due to mortality or movements to other breeding territories [60]. Survival rates for rehabilitated peregrine falcons 1 year after release are approximately 14%. Some rehabilitated peregrine falcons reproduce successfully after release [168].

Nestling mortality is highest within 5 to 7 days after hatching [45,80]. In a review, White and others [190] determined average first-year survival ranges from 40% to 50% after fledging. However, few reliable mortality estimates were recorded as of 2002 (review by [190]). Annual survival for nestlings on Langara Island, British Columbia, was estimated at 45% to 55% [130]. On Rankin Inlet, Nunavut, 14% of nestlings failed to fledge at nests that produced at least one fledgling [43,45]. Less than 4% of the nestlings raised were recruited into the breeding population in later years [42]. Minimum first-year survival for peregrine falcons in the Midwest was estimated at 23%, but the estimate is likely low [172].

Hazards for urban peregrine falcons include collisions with buildings, automobiles, airplanes, and power lines [33,72,168]. Hazards in areas with low human populations include shooting, electrocution via power lines or lightning, and airplane strikes (Santa Cruz Predatory Bird Research Group unpublished data cited in a review by [190]). Adults and immatures are vulnerable to automobile collisions when scavenging roadkill [29]. Predation and accidental loss contribute to the loss of eggs and nestlings [27]. Common causes of death for nestlings and fledglings include predation, disease, starvation, electrocution, human interference, collisions with automobiles or aircraft, windows or other man-made objects, becoming ensnared on a building, falling into chimneys, and drowning after falling from bridges [9,29,168]. In Kentucky, fledglings in smokestack nests died after becoming entangled in a ladder or lost in a building [39]. In Alaska, cold temperatures, accidental destruction of the eggs, and insufficient incubation by adults cause greater nest failure than predation. Cade [27] determined that starvation was likely the most common cause of death for independent peregrine falcons <1 year of age.

Dispersal: Female peregrine falcons typically disperse farther from area where they hatched to breeding sites than males [3,8,172].In the Midwest, females dispersed an average of 200 to 214 miles (320-345 km), while males dispersed an average of 108 to 109 miles (174-176 km) [172]. Females in New England dispersed from 39 to 485 miles (63-781 km) [169]. Barclay and Cade [8,9] reported that wild and hacked peregrine falcons dispersed from 0 to 2,613 miles (4,205 km) in the eastern United States. On average, wild and hacked females dispersed 220.3 miles (354.5 km), and wild and hacked males dispersed 193.0 miles (310.6 km). Only 7% of wild and hacked birds recovered in the eastern United States moved distances >500 miles (800 km) after independence [8]. At the Yukon River, Alaska, females dispersed an average of 75 miles (121 km), while males dispersed an average of 43 miles (69 km). All but 2 birds ultimately settled in the drainage where they hatched. The 2 females that did not return to their original drainage bred in drainages 87 to 130 miles (140-210 km) away [3]. At Rankin Inlet, Nunavut, males dispersed 3.7 to 8.7 miles (6.0-14.0 km), while 1 female dispersed 12.7 miles (20.5 km) from her original territory [42]. In western Greenland, mean dispersal distances were similar between the sexes, with females moving 16.8 miles (27.1 km) and males moving 17.5 miles (28.1 km). Males dispersed up to 40 miles (65 km), while most females dispersed up to 25 miles (40 km). The only long-distance dispersal in the study was a female that dispersed 429 miles (690 km) [146].

Peregrine falcons often return to breed near the area in which they fledged [45,169]. Young females visiting cliffs with a resident pair are occasionally fed by the adult male, suggesting that the young females are subadults raised on the same cliffs the previous year [80].

Flight: Cruising flight speed for peregrine falcons typically ranges from 25 to 60 mph (40-97 kph) [28,40,41,108,144,191]. Flight while pursuing prey approaches speeds of 60 mph (100 kph) [108]. Maximum

horizontal flapping flight is likely between 65 and 71 mph (105-115 kph) [28,61]. When migrating, peregrine falcons glide between thermals without needing to beat their wings, allowing minimal energy expenditure [40]. Observed air speeds of peregrine falcons gliding between thermals were 38 to 40 mph (62-64 kph) [40,43]. Low-altitude flapping flight is observed when thermals are absent [40]. Soaring peregrine falcons may reach 1,100 feet (330 m) in altitude [191]. Peregrine falcons migrate at low altitudes, typically flying <2,000 feet (600 m) above ground or water (Cochran 1985 cited in a review by [100], Kerlinger 1989 unpublished data cited in a review by [100]).

In one study, peregrine falcons migrating from North America to South America in fall averaged 107 miles (172 km) per day. Peregrine falcons migrating northward in spring averaged 123 miles (198 km)/day [74]. In another migration study, an immature male traveled 1,637 miles (2,634 km) over a 15-day period. On average, he traveled 111 miles (179 km)/day, including an average of 13 miles (21 km)/day of low-hunting flight. Under favorable conditions, the immature male traveled up to 200 miles (322 km)/day. His migratory flight averaged 21 mph (34 kph), with a range of 6.8 to 30.5 mph (10.9-49.1 kph). Migratory movements during inclement weather are limited. Little migratory flight is observed during low cloud cover and rain. Migratory flights may end early in strong winds. Peregrine falcons do not migrate into hurricanes [40].

PREFERRED HABITAT:

Landscape: Cliffs and tall, man-made structures surrounded by open landscapes with nearby riparian areas provide desirable habitat for peregrine falcons [54,57,59,140,144]. Peregrine falcons can be found from mountainous regions to coastal areas [27,36,59,130]. Topography ranges from flatlands and high plateaus to rugged canyons, especially when associated with high nesting cliffs surrounded by open expanses near permanent to semipermanent water sources [57,140]. Peregrine falcons nest on cliff ledges or stick nests on cliffs above or near open water including lakes, ponds, rivers, and seas [35]. Peregrine falcons usually nest 0.5 to 1 mile (0.8-1.6 km) from water ([13] as cited in [87]).

High cliffs with sweeping views are generally preferred over low cliffs and hills or narrow canyons and ravines [144]. The importance of cliff height and length is influenced by local availability and likelihood of disturbance [88,185]. Habitats supporting high concentrations of birds within a 10-mile (16 km) radius of nesting sites are considered essential to the peregrine falcon. Habitats that typically have high concentrations of birdlife include grain croplands and riparian areas along rivers, ponds, marshes, and meadows. Additionally, open areas where avian prey are vulnerable, including pastures, grasslands, mountain valleys, and gorges, are highly beneficial to peregrine falcons [173]. In southwestern New Mexico, prey are vulnerable to peregrine falcons due to large open canyons and valleys. This vulnerability may compensate for lower prey abundance compared to other areas where peregrine falcons occur [62]. Peregrine falcons bathe frequently and may benefit from the accessibility of gravel bars in or next to rivers [27].

Peregrine falcons in Alaska favor cliff habitats near large river systems and coastal areas [27,145]. The landscape along the Yukon River, Alaska, has abundant cliffs and diverse lowlands comprised of low, rounded benches and ridges spanning southwest to northeast. These areas experience frequent wildfires and other disturbances [5]. Landscape features in Idaho include volcanic plateaus and faulted/folded mountain ranges reaching 7,000 to 9,000 feet (2,100-2,700 m) above sea level. Most valleys are over 6,000 feet (1,800 m) in elevation ([97,176] cited in [18]). Habitat in central and eastern Kentucky has highly dissected cliff systems with complex topography. Landscape features highly influence the movements and dispersal of fledglings and reintroduced peregrine falcons in Kentucky. Nonforested corridors within a forested matrix were essential to fledgling and reintroduced peregrine falcon dispersal. Agricultural areas with forested river corridors were also important for reintroductions in Kentucky [55]. In southern Greenland, the landscape is characterized by steep cliffs, abundant lakes and marshes, and mountainous areas <3,300 feet (1,000 m) in elevation [67].

Habitat: Peregrine falcons show little preference for specific ecological communities [27]. Because of their hunting behavior, peregrine falcons are most adapted to open or partially wooded habitats [142]. Associated habitats from sea level to 13,000 feet (4,000 m) include coastal areas, plains, grasslands, shrublands, heaths, steppes, forests, and deserts [28,36,57,59,140,144,155]. Peregrine falcons rarely occur in alpine habitats [28] or dense, closed forests [142,144]. No preference was shown between tundra, taiga, maritime, and interior regions in Alaska [27]. According to a review, primary peregrine falcon habitat in the Pacific Northwest and British Columbia includes nesting cliffs along or near the coast and foraging areas that include tidal flats, beaches, interior marshes, prairies, or other open areas [106]. Cliffs in California are surrounded by patches of coniferous forest, sagebrush scrub, oak woodland, grassland, chaparral, or marshes [36]. Peregrine falcons in southern and central California are most common in areas relatively close to coastal wetlands including the northern and southern Santa Lucia Ranges and the Santa Ynez Mountains [165]. Additionally, habitat in central California includes sloughs, creeks, other riparian habitats, oak woodlands, uplands, valley grasslands, and "historic" interior wetlands [177]. During migration, peregrine falcons stop over on South Padre Island, Texas, primarily occupying wind-tidal flats and dunes on the island and fields, lakes, and dunes on the adjacent mainland [96]. At the end of each day, an immature male migrating from Wisconsin to Mexico primarily occupied wooded areas near bottomlands and rivers [40].

According to Smith and others [160], peregrine falcons inhabit successional forests. Peregrine falcons in the Pacific Northwest breed and hunt in grass-forb, shrub-seedling, pole-sapling, young, mature, and old-growth coniferous forest [155]. They do not hunt within dense forest canopies, but they do hunt above forest canopies and expanses between stands [173]. Wellersdick and Zalunardo [182] asserted that peregrine falcons were heavily dependent on snags in the Cascade Range, but they did not discuss any observations from which to base that conclusion. Six tree eyries in dense Sitka spruce forests on offshore islands along the northern coast of British Columbia were described by Campbell and others [38]. In Kentucky, hacked peregrine falcons perched in decaying pine trees that had large DBH and were surrounded by few deciduous trees. On average, perch trees in Kentucky had greater DBH, a more advanced stage of decay, and a greater field of view than nearest-neighbor trees that were not used for perching. In 2 models, perch use in Kentucky was positively associated with DBH and advanced stages of decay ($P<0.001$), while negatively associated with tree height and deciduous tree density ($P<0.001$) [39].

While peregrine falcons utilize riparian areas within desert habitats, they do not solely rely on them. Many desert fauna travel through or seek refuge in desert riparian habitats [135]. This potential prey may attract peregrine falcons. Peregrine falcons breed in the Great Basin, Chihuahuan, and Sonoran deserts [135]. Peregrine falcons in the desert Southwest typically do not nest in areas receiving <10 inches (250 mm) of annual rainfall. Nest sites in the Southwest receiving 5 to 10 inches (120-250 mm) of annual rainfall are near extensive permanent surface water. In Arizona, peregrine falcons nest in areas with rainfall ranging 6 to >30 inches (150-760 mm) [57]. Riparian habitats in the Mojave Desert are sparsely vegetated due to low annual rainfall [135]. Plant community composition and structural complexity in the Mojave Desert are limited by soil moisture availability and occasionally, extreme winter temperatures (Brown 1982 personal communication cited in [135]). These factors may inhibit peregrine falcons from breeding in the Mojave Desert. Peregrine falcons have been observed foraging in canyons in central New Mexico. However, breeding has not been observed in the area [117].

Winter range may include urban areas [1], coastal marshes [63], mangrove forests, river valleys, lakeshores ([16] cited in a review by [190]), other wetland areas [140], pastures, and open areas with little dissected topography, cover, or cliffs ([16] cited in a review by [190]) where avian prey is abundant. Winter habitat on the coast of British Columbia includes dense shoreline forests and wooded islands [11]. In Utah, postbreeding adults and immatures, either resident or migrant, winter near marshes where avian prey congregate [140]. Peregrine falcons overwinter around the Colorado River Delta at the western edge of the Sonoran Desert [90].

Limiting habitat features: Factors that limit habitat suitability for peregrine falcons vary between locations. Primary factors may include limited access to prey, such as shorebirds and passerines (Passeriformes), and limited nest site availability [87,140,173]. Diverse communities of avian prey are attracted by large water sources [140,170]. Thus, peregrine falcons tend to inhabit areas near large bodies of water including wetlands, lakes, streams, and marine environments [140]. Coastal areas and islands where high winds, heavy fog, and low ambient temperatures are typical in summer may limit peregrine falcon populations in the Arctic [27]. In the desert Southwest, key habitat features include areas of high topographic relief and tall, expansive cliffs within 3 miles (5 km) of permanent or near-permanent surface water. Vegetation, precipitation, and availability of surface water appear to influence nest site suitability for peregrine falcons in Arizona [57]. Presumably, proximity to water in

desert habitats promotes peregrine falcon hunting success. ([20,79], (Walk and Schmitt 1977 personal communication cited in [170])

Elevation: The elevations of peregrine falcon eyries are largely based on local availability. Peregrine falcons nest from sea level in coastal areas to high mountain cliffs [59,130,170,173]. Peregrine falcons in northern Alaska do not appear to nest above 2,200 feet (670 m). Peregrine falcons may reach their altitudinal limit at 2,500 to 3,000 feet (800-900 m) in the Arctic [189]. Elevations of suitable habitat of a reintroduced population in Kentucky range 660 to 1,300 feet (200-400 m) [55]. In Arizona, nesting peregrine falcons occupy territories at elevations up to 9,000 feet (2,700 m) [57]. Mean elevation of eyries in Utah was 4,701 feet (1,433 m). Mean elevation of nesting cliffs in Utah was 4,813 feet (1,467 m) [77]. Nesting sites in Colorado have been recorded at 10,500 feet (3,200 m) [173]. However, most nesting cliffs in Colorado are located below 9,000 feet (2,700 m) ([59,173], Welch 2008 personal communication [181]). Eyrie elevations throughout California typically range from sea level to 9,000 feet (2,700 m) [170]. In Greenland, the mountainous regions range up to 3,300 feet (1,000 m) above sea level [26,67]. Peregrine falcons overwintering in Veracruz, Mexico, are found at elevations of 0 to >5,000 feet (1,500 m) [153]. The maximum recorded elevation of a peregrine falcon eyrie is an unconfirmed report of a nest at 13,000 feet (4,000 m) in California [170].

Territoriality: Territories appear to have 2 defended components. Peregrine falcons aggressively defend a 0.05- to 1-mile (0.09-1.6 km) radius around the nest from other large or predatory birds [27,129,130,170]. Peregrine falcons attack any large bird that ventures too close to the nest, including great horned owls (*Bubo virginianus*), barn owls (*Tyto alba*), bald eagles (*Haliaeetus leucocephalus*), golden eagles (*Aquila chrysaetos*), red-tailed hawks (*Buteo jamaicensis*), ferruginous hawks (*Buteo regalis*), Cooper's hawks (*Accipiter cooperii*) ([20,79], (Walk and Schmitt 1977 personal communication cited in [170]), ospreys (*Pandion haliaetus*), great blue herons (*Ardea herodias*), cormorants (*Phalacrocorax* spp.), gulls (*Larus* spp.), [170], common ravens (*Corvus corax*), and turkey vultures (*Cathartes aura*) ([20,79], (Walk and Schmitt 1977 personal communication cited in [170]). Territorial defense often includes stooping (diving) at potential predators [27,79]. Favorite hunting stations, typically a high perch with sweeping views, and plucking stations, where captured prey is plucked or consumed, are defended as well [27]. An exception to this behavior was observed in arctic Alaska, where territories were established for nest defense but not for foraging [189]. In winter, peregrine falcons defend ledges that were used as prey observation points and plucking perches [1]. Territorial behavior is also displayed around favored hunting ranges and plucking sites in winter [1,190]. Winter defense is most aggressive within 1,000 feet (300 m) of the plucking perch [1].

In Alaska, an average of 3.4 to 3.5 miles (5.4-5.6 km) separated nesting pairs, with the closest pairs being 0.2 to 0.6 mile (0.3-1.0 km) apart (Swem and Ambrose 2002 personal communications cited in a review by [190]). The mean distance between peregrine falcon nests in Rankin Inlet, Nunavut, was 2.1 miles (3.3 km), with a range of 0.4 to 6.1 miles (0.7 to 9.8 km) [42,43]. Territory size may be influenced by prey abundance [130]. Some breeding pairs on Langara Island, British Columbia, nested less than 0.25 mile (0.4 km) apart. Generally, there were no signs of aggression between breeding pairs on Langara Island, British Columbia, despite the close proximity of nests [11]. Distance between pairs in the Aleutian Islands, Alaska, was 0.7 mile (1.1 km) or greater [188]. Since population density in a given area changes over time [21,42,44,45,116,130], territory size and distance between nesting pairs will likely fluctuate as well.

Conflicts between nesting peregrine falcons and other species nesting nearby are common [15,27]. However, tolerance of other species near the nesting territory varies widely. In Alaska, golden eagles are attacked more aggressively than other predatory birds, including hawks and other eagles (Accipitridae), owls (Tytonidae and Strigidae), gulls (Laridae), jaegers (*Stercorarius* spp.), and common ravens [27]. Peregrine falcons rarely nest in close proximity to golden eagles or gyrfalcons [27,190]. Peregrine falcons have a tumultuous relationship with great horned owls as well. The 2 species may nest close together with little conflict. At other times, conflicts between peregrine falcons and great horned owls may result in death of adults or young of either species (review by [190]). On the Los Padres National Forest, California, a peregrine falcon eyrie, red-tailed hawk nest, and great horned owl nest were in very close proximity. Skirmishes between the 3 species were frequent due to the closeness of the nests [79]. Peregrine falcons occasionally nest within 300 feet (90 m) of common ravens and hawks [27]. However, conflict between peregrine falcons and common ravens may decrease breeding success (review by [190]).

Peregrine falcons compete for nest sites with other raptors (review by [190]). For example, gyrfalcons may prevent peregrine falcons from using optimum nesting sites. In western Greenland, peregrine falcons and gyrfalcons

occupied the same nesting sites during different years [26], so competition for nesting sites may exist between the 2 species where populations overlap. Prairie falcons may nest within close proximity to peregrine falcons [120], and nest competition between these species also occurs. Peregrine falcons may usurp prairie falcons from a desirable territory (review by [190]).

Both individuals of a breeding pair may remain near the nesting site in winter, but the birds tend to be solitary, occupying individual territories or feeding areas [144,189]. In nonmigratory populations, peregrine falcons may continue to inhabit the same general territory or occupy an area near the breeding territory during winter, but such behavior is highly variable. Maintenance of sedentary pair bonds in winter may be partially influenced by having sufficient prey available to feed both peregrine falcons [144].

Home range and density: The size of peregrine falcon home ranges, including hunting ranges beyond the actively defended area near the eyrie, is influenced by prey and nest site availability [140,144]. Peregrine falcon density can be high when avian prey is abundant [144]. Along coastal British Columbia, peregrine falcons concentrate in areas with abundant potential prey, which may be a more important feature of their habitat in that area than cliffs or any other landscape feature [12]. Population size of raptors is often limited by availability of suitable nesting sites [92,93].

Historically, the highest peregrine falcon population densities in North America were observed in the subarctic (50-60 °N) and low Arctic (60-70 °N) [27]. High population densities for Peale's peregrine falcons on Langara Island, British Columbia, were recorded before the global decline in peregrine falcon populations was evident. Numerous cliffs and abundant seabirds minimized competition. Density for the entire 25-mile (40 km) perimeter of Langara Island was 16 to 20 breeding pairs from 1952 to 1958. The highest concentration of nesting peregrine falcons included 5 to 8 nesting pairs within a linear distance of approximately 1.75 miles (2.8 km) [11]. In Utah, the historical average distance between eyries was 130 miles (209 km). Some eyries in Utah were as close as 2 miles (3.2 km) apart [140].

In Colorado, estimated mean home range during nesting was 138 to 582 mi² (358-1,508 km²) for 2 adult males and 3 adult females [61]. An adult male in Alaska had a hunting range of 123.5 mi² (319.8 km²) [191]. Hunting range estimates by Mearns [120] in Scotland were 3.5 to 8.5 mi² (9-22 km²) for 2 females when nestlings were present and 9 to 45 mi² (23-117 km²) after young fledged. First-year peregrine falcons wintering on the Texas coast were highly mobile around tidal flats. An adult female and a 2nd-year female on the Texas coast were more sedentary than 1st-year peregrine falcons in winter. On the Texas coast, winter hunting ranges of peregrine falcons were 12 to 17 miles (20-28 km) in diameter [66]. On winter grounds in an urban area of Brazil, the estimated hunting ranges were 1.21 mi² (3.14 km²) for one male and 3.93 mi² (10.17 km²) for one female [1].

Peregrine falcon density estimates across North America		
Location	Density Estimate	Date of Estimate
southeastern Alaska and the Aleutian Islands	1 pair/10.0-80.0 km between occupied cliffs	1969-1985 [4]
Kuskokwim River, Alaska	1 pair/9-47 km	1980 (Ambrose 1980 cited in [122])
Alaska, arctic	1 pair/3.2-3.8 km along river corridor	1990s (Swem 2002 unpublished data cited in a review by [190])
Northwest Territories, arctic	1 pair/97-362 km²	1982-1985 [21]
Rankin Inlet, Nunavut	1 pair/15.5 -26.5 km² or 1 pair/3.3 km, average linear distance	1981-1995 [42,44,45,99]
western Greenland	1 pair/92-116 km² average	1984-1985 [116]
Langara Island, British Columbia	1 pair/3.2-4.3 km average	1968-1975 [130]
California, northern coast	1 pair/471-654 km²	2001 (Walton 2002 personal communication cited in a review by [190])
California, insular and coastal zones	1 pair/23.8-51.5 km, linear distance	1975-1976 [170]
	1 pair/5.1-6.4 km²	

Colorado and Utah, Dinosaur National Monument		No data (Petersburg 2002 personal communication cited in a review by [190])
Arizona, Grand Canyon National Park	1 pair/16.3 km²	1988-1989 (review by [190])
Texas	1 bird/50 km²	1993-1994 [66]
Urban populations	1 pair/3.6 km²	2001 (review by [190])

COVER REQUIREMENTS

- Cliff nest sites
- Cliff characteristics
- Nest elevation
- Cliff exposure
- Alternate nest and roost sites
- Nest competition
- Nest fidelity

Cliff nest sites: Eyries are typically on broad, open cliff ledges or in shallow caves and range from 32 to 86 feet² (3-8 m²) in area [43,144,170]. Eyries may also be found in deep recesses and rock cavities known as "potholes" [27,193] that have been carved out of cliffs by weathering. Small amounts of vegetation are common at eyries [43,144,170].

Peregrine falcons do not build nests [144]. Rather, they make scrapes (scratch out a shallow bowl in the substrate on a ledge) or take over unused nests built by other avian species [129,144,183]. Scrapes are typically 7 to 9 inches (17-22 cm) in diameter and 1 to 2 inches (3-5 cm) deep. Ledges with a long history of use tend to contain more substrate than ledges that have supported minimal nesting in the past [144]. Multiple scrapes may be made during courtship before one is chosen for nesting [140,144]. The purpose of making multiple scrapes is currently unknown.

A ledge must be large enough to hold a brood of young as they develop. Several ledges on a cliff may be used for nesting, but often only a few ledges are most preferred. Some eyries are used repeatedly over time, but not necessarily by the same pair. All but very small cliffs have some ledges that are potentially suitable for a peregrine falcon nest. Thus, availability of cliff ledges is likely not a limiting factor for peregrine falcons in most habitats [144].

Preferred eyrie ledges have high overhanging rock that allows adults to easily fly in and out of the nest site [170] and provides protection from the weather, falling rocks, and predators [27,144]. However, overhangs do not appear to be a requirement [68,87]. Historically, some peregrine falcon eyries on the Queen Charlotte Islands, British Columbia, were sheltered by the roots of Sitka spruce trees growing on the cliff brink [78] or under overhanging vegetation and snags at the top of the cliff [11]. Brush above eyries may screen the nest from predators [27]. Vegetation on nest ledges provides shade for young peregrine falcons. Fecal matter combined with prey remains may provide a nutritive base on which grasses or other vegetation may establish [26]. Shade at eyries is essential when day time temperatures reach 90 °F (32 °C) or higher. Adults may be able to shade nestlings during periods of excessive heat, but adults have limited tolerance to direct sunlight as well [126].

Cliff charcteristics: Characteristics of nesting cliffs are highly variable, depending on local availability, prey abundance, competition, predation pressure, and proximity to water. In inland western Greenland, availability and accessibility of prey appears to influence eyrie selection more than ledge elevation [26]. Large cliffs that offer a wide view of the surrounding landscape are used more often than small cliffs [132]. Viewing range from nest ledges in southern Greenland averaged 159 degrees [68]. Large cliffs with a wide view may make hunting easier. Large cliffs may also offer more protection from terrestrial predators than small cliffs [132]. Cliff heights required by nesting peregrine falcons may be lower in remote areas than in areas with high human disturbance [88]. Subadult females that mated with adult males in Massachusetts often nested in low-quality sites with low cliff height, high human disturbance, or poor ledges [80]. Presumably, higher-quality sites were already occupied. The highest cliffs on Rankin Inlet, Nunavut, are typically occupied first because they provide shelter from weather in spring. Peregrine

falcon pairs occupy low cliffs if higher cliffs are already occupied. Pairs occupying low cliffs perch on other cliffs for a period of time after arriving in the nesting area and prior to establishing a territory [45]. Unused cliff ledges may be visited by unmated adults looking for potential territories for the future. Unmated peregrine falcons may set up a territory on an unoccupied cliff and attempt to find a mate [144].

Eyries typically have sweeping views of the surrounding landscape and overlook or are located near a permanent water source. Eyries in a Colorado study were all within 2.5 miles (4 km, x =1.5 miles (2.4 km)) of the nearest permanent water source [59]. Occupied cliffs in Utah are typically in close proximity to water including reservoirs, rivers, and marshes [140]. The average distance from nesting cliffs to water in Utah was 1,558 feet (475 m), with a range of 138 to 9,780 feet (42-2,981 m) [77]. Peregrine falcons near major water sources in Arizona generally nest low on cliffs, while pairs nesting far from water tend to nest higher. Cliffs within 6 miles (10 km) of a permanent water source are highly favored for nesting in Arizona. Peregrine falcons nesting in locations with low rainfall (<10 inches (250 mm)/year) are typically near a large permanent water source [57]. Water was available within 2 miles (3 km) of all eyrie cliffs in the Sierra Madre Oriental [105]. On Rankin Inlet, Nunavut, nesting cliffs were within 1,000 feet (300 m) of a major body of water, including 72% that bordered Hudson Bay [45].

When potential nesting sites are abundant, cliffs over 100 feet (30 m) tall are often selected. Where nesting sites are scarce, cliffs less than 50 feet (15 m) high may be utilized [185]. Heights of cliffs with eyries in areas with low human disturbance tend to be lower than areas of high disturbance [88]. Pairs from stable or increasing populations may nest on small cliffs that may be less than ideal [116]. Nesting cliffs in Pennsylvania and New Jersey that were rated as the most favorable had a sheer or nearly sheer rock face over 200 feet (61 m) high and at least 500 feet (150 m) long, with multiple potential nesting ledges [147]. Essential habitat requirements for peregrine falcons in Colorado include cliffs ranging from 40 to 2,100 feet (12-640 m) in height, with cliffs 200 to 400 feet (60-120 m) preferred for nesting [173]. Peregrine falcons nested on vertical cliffs averaging 308 feet (94 m), with a range of 72 to 650 feet (22-198 m) high, in another Colorado study [59]. In Utah, mean nest cliff height is 178.0 to 561 feet (54.3-171 m) [77,140], with a range of 40.0 to 1,000 feet (12.2-305 m) [77,140,193]. Suitable nesting cliffs in an Arizona study varied from either ≥125 feet (38 m) in a series of cliff layers totaling ≥250 feet (80 m) or a vertical cliff face ≥200 feet (60 m) high. Cliffs primarily used for nesting in Arizona were mostly vertical (80-90°), and all cliffs were at least 70° overall, with vertical sections below the eyrie [57]. Cliffs utilized by peregrine falcons in the Sierra Madre Oriental were a minimum of 246 feet (75 m) high. In the Sierra Madre Oriental, cliffs on high ridges were 1,600 to 3,300 feet (500-1,000 m) above the valley floors [105]. Cliffs used for nesting on Langara and Cox islands, British Columbia, ranged 20 to 300 feet (6-90 m) above the beach. Langara and Cox islands were uninhabited by humans [11]. On Rankin Inlet, Nunavut, nesting peregrine falcons utilized cliffs 13 to 100 feet (4-30 m) in height [43,45]. In Greenland, nest sites were primarily on the upper half of vertical cliffs 89 to 394 feet (27-120 m) high, not including steep talus below most cliffs [26,116]. Only one eyrie in western Greenland was located on a low, broken cliff approximately 20 feet (6 m) above the ground [26]. Long cliffs are also preferred when peregrine falcons choose nesting sites [185].

Preferred roosts are often small ledges, knobs, or projections with protective overhangs on steep rock faces [144]. Multiple lookout points and available cover were considered highly desirable on a large nesting cliff in Pennsylvania and New Jersey [147]. Several roosting places are often found on a nesting cliff [144]. Perches in California were on ridges within 0.6 mile (1 km) of the eyrie [65]. Males often perch near the eyrie while the female broods the young [144].

Nest elevation: Nests are generally located on the upper half of the cliff [27,68,77,116,193]. However, this is not always true [45]. Historically, distances from the cliff brink to eyries ranged 0 to 331 feet (2-101 m) in Alaska. Eyries were 0 to 250 feet (0-80 m) up the vertical face of the cliffs [27]. In Greenland, nest sites were on the upper half of vertical cliffs 89 to 390 feet (27-120 m) high [116]. On average, eyries in Greenland were located approximately 59% above the bottom of the cliff (range 31-71%) [68]. Peregrine falcon nests at Rankin Inlet, Nunavut, were located 7 to 85 feet (2-26 m) above the cliff base [43,45]. The highest nest on Rankin Inlet was 85 feet (26 m) from the base of a 98 feet (30 m) cliff [45].

Eyrie heights above the cliff bases in southern Utah ranged 82 to 834 feet (25-260 m) [77,193]. Porter and White [140] determined that eyries in Utah can be > 1,000 feet (305 m) above the cliff base. Eyrie heights above cliff bases in the Sierra Madre Oriental ranged 160 to 250 feet (50-75 m) regardless of overall cliff height [105].

Cliff exposure: Cliff orientation may be influenced by availability rather than a choice of a particular exposure in some locations [45]. Local climatic conditions may influence the importance of nest or cliff aspect [87,185]. In the Southwest and southern Rocky Mountains, southern exposures are largely avoided [57,59,69,77,140,193] due to excessive afternoon heat. All aspects other than due south, including southeast and southwest, are used for nesting in southern Utah [77,193]. Nests in the Southwest that face south or west are often on deeply recessed ledges with a boulder or vegetation on the ledge or with overhanging rock that provides afternoon shade [57,77]. Peregrine falcons in the Southwest, including unmated individuals, may utilize cliff ledges facing all directions for activities other than nesting [69].

In the Arctic, southerly exposures are preferred ([26,44,116], Blood 1973 cited in [87]). They are substantially warmer than northern exposures [26]. Nest ledges in southern Greenland faced southwest on average, with a range of southeast to north-northwest [68]. Most cliffs used by peregrine falcons on Rankin Inlet, Nunavut, faced southwest, although nesting success on north-facing cliffs was similar [43].

Alternate nest and roost sites: Although peregrine falcons primarily nest on cliff ledges (review by [190]), nesting in trees, on the ground, or on man-made structures is common [27]. The use of old or abandoned stick nests from other species, including abandoned common raven nests on electric pylons, transmission towers, stone quarries and silos; osprey and cormorant nests on channel buoys; bald eagle nests along the Pacific Coast; common raven, cormorant, and red-tailed hawk nests on sandy coastal bluffs; and other nests within snags or man-made structures, is widespread ([38,72,144,190], review by [37]). While peregrine falcons prefer cliff habitats, in the Canadian Arctic where cliffs are not present they readily nest on riverbanks, coastal areas, dykes, low mounds, or boulders. Nests in riverbanks are usually situated in hollows; in potholes under tree roots at the top of the bank; under roots; or under rock outcrops protruding from the face of the bank. Nests on dykes are usually in recesses under overhanging rocks jutting out from the dyke [75]. In Alaskan tundra, where cliffs are lacking, peregrine falcons nest on road cuts or pingos (low hills or mounds forced up by hydrostatic pressure in an area underlain by permafrost) (Ritchie 2002 personal communication cited in a review by [190]). Nests on boulders and hummocks in the Canadian Arctic are typically exposed, with little or no overhead protection (Kelsall 1969 personal communication cited in [75]). In Sitka spruce forests in coastal British Columbia, peregrine falcons nest on rock outcrops and on ledges sheltered by overhanging trees or tree roots [37]. Ground nests in heather and other vegetation are uncommon and are typically in areas with no cliffs. Peregrine falcons using ground nests occasionally brood successfully, including those using ground nests accessible to mammalian predators [144].

Use of abandoned nests from other avian species appears to be most widespread in arctic and subarctic regions. Historically, 19% of nests on the Colville River, Alaska, were located in old rough-legged hawk (*Buteo lagopus*) nests [27]. Breeding peregrine falcons in coastal British Columbia utilized abandoned bald eagle nests 39 to 66 feet (12-20 m) high in Sitka spruce. Two peregrine falcon pairs likely nested in tree cavities on small islands with dense forest [38]. Several nests in Rankin Inlet, Nunavut, were located in abandoned rough-legged hawk stick nests approximately 11 feet² (1 m²) or larger [43]. A pair of peregrine falcons in western Greenland nested in an old common raven nest on a northern exposure [26].

Peregrine falcons in urban and rural areas nest on office buildings, casinos, power plant smokestacks, bridges, overpasses, loading cranes, quarries, iron mines, water tanks, silos, and other structures [33,55,72,171]. Nests on such structures are often successful [171]. Peregrine falcons using man-made structures in metropolitan centers are often aided by artificial nest boxes or the addition of pea gravel to the existing structure, which provides nesting substrate [14]. Most urban peregrine falcons utilize artificial nest boxes filled with pea gravel [33]. Shaded ledges and air conditioners near plucking perches are used as roosting sites by peregrine falcons overwintering in urban Brazil. Peregrine falcons wintering in urban Brazil occupied ledges within 1.2 miles (2 km) of a river, and frequently hunted over or in the vicinity of the river [1].

Nest competition: In arctic Alaska, multiple pairs of peregrine falcons nested on the same cliff when the cliff was at least 1.75 miles (2.8 km) long [189]. Mean minimum distance between eyries in Greenland was 4.8 miles (7.7 km) [116]. In Ungava Bay, Quebec, peregrine falcon pairs did not nest on adjacent cliffs. Typically, there was at least one vacant cliff next to or across from a nesting pair [17]. At the beginning of the breeding season, resident peregrine falcons attempt to drive away competitors that arrive at a cliff first [43].

Rough-legged hawks, gyrfalcons, and common ravens utilize similar nesting sites and may compete with peregrine falcons for this resource [189,199]. Some peregrine falcon nest sites were previously used by gyrfalcons [116]. In arctic Alaska, peregrine falcons, gyrfalcons, rough-legged hawks, and common ravens may concurrently nest on cliffs ranging 0.75 to 5.0 miles (1.2-8.0 km) in length [189], suggesting that competition for nesting sites in the area was low. A cliff several hundred meters long in Ungava Bay, Quebec, housed successful nests of peregrine falcons, rough-legged hawks, and common ravens. Peregrine falcons and gyrfalcons also shared cliffs in Ungava Bay [17]. Peregrine falcons nesting along the Colville River, Alaska, incubated 2 rough-legged hawk eggs in addition to their own. Presumably, the peregrine falcons usurped the rough-legged hawks after egg laying began [199].

Nest fidelity: Peregrine falcons exhibit a high degree of nest-site fidelity [3,8,45,60,80,172]. High nest-site fidelity likely reinforces pair bonds [172]. Peregrine falcons typically return to the same territory to breed in successive years, but not necessarily to the same eyrie [27,35,45,116,119,138,144,169,173]. In Colorado, 77% of females and 83% of males returned to the same breeding territory in subsequent years [60]. A pair of peregrine falcons on Rankin Inlet, Nunavut, remained bonded at the same territory for at least 4 years [45]. A nest site may be used for decades, with many pairs of peregrine falcons occupying the same territory over time [144]. However, some previously used nesting sites may not be occupied every year [58]. Nest site reoccupancy rates can range from 50% to 100% [3,35,58,60].

FOOD HABITS:

- Diet
- Foraging behavior
- Hunting methods

Diet: Peregrine falcons are generalists and show a tendency to capture virtually any small to medium-sized prey available [26,157,170]. In North America, at least 429 bird species, 10 bat species, 13 other mammal species, 4 fish (Osteichthyes) species, and insects (mainly Orthoptera and Odonata) had been cited as peregrine falcon prey as of 2002. Worldwide, the number of avian prey species may exceed 2,000 (review by [190]). Prey ranges in size from small passerines, shrews (Soricidae), and voles (Arvicolinae) to large waterfowl, owls, turkey vultures, and snowshoe hares (*Lepus americanus*) [33,34,59]. While avian prey dominate the peregrine falcon's diet throughout its range, the proportion of other types of prey is highly variable. In a review, Sherrod [157] determined that 76.7% to 100% of the peregrine falcon diet consisted of small- to medium-sized birds, while small- to medium-sized mammals made up to 6.9% of their diets. Observations near an eyrie on the Los Padres National Forest, California, show that the peregrine falcon diet in that area was 76% birds and 24% mammals [79]. On average, the peregrine falcon diet consists of 76.7% birds, 3.4% mammals, and 19.8% invertebrates (review by [162]).

In general, passerines, shorebirds, and waterfowl are the most frequently hunted prey [144,190]. However, any bird flying above a forest canopy is potential prey for a peregrine falcon [27]. Shorebirds are common prey near aquatic habitats [140,190]. Mammals captured by peregrine falcons include shrews, bats (Tadaridae and Vespertilionidae), arctic ground squirrels (*Spermophilus parryii*), voles (*Microtus* spp. and *Clethrionomys* spp.), and hares (Lagomorpha) (review by [157]). Mexican free-tailed bats (*Tadarida brasiliensis*) can be important prey where large bat populations congregate at roosting caves [1,109,159,164]. Unusual prey include fox (*Vulpes* spp.) kits, frogs (Anura), and fish [144]. Nestlings of other bird species are taken as prey [150]. Large birds of prey are not typically hunted [27]. However, any predatory birds killed during territorial conflicts may be eaten [27,144]. Prey is typically 2 to 18 ounces (50-500 g) in mass. The larger size of females allows them to capture larger prey than males. Females capture and carry prey weighing up to 49 ounces (1,400 g) [144]. Large prey, including large waterfowl, are generally eaten on the spot. Smaller waterfowl are usually carried to a feeding perch or tree before being consumed [51].

Prey is usually selected in relation to availability [144]. Thus, peregrine falcon diets are highly variable by region. Major foods in urban areas include many native and nonnative passerines such as northern flickers (*Colaptes auratus*), blue jays (*Cyanocitta cristata*), American robins (*Turdus migratorius*), mourning doves (*Zenaida macroura*), rock pigeons (*Columba livia*), and European starlings (*Sturnus vulgaris*), as well as riparian birds if the city is near a major water source [1,33,72,131,190]. In rural Kentucky, peregrine falcons primarily hunt eastern meadowlarks (*Sturnella magna*), rock pigeons, and European starlings [39]. Primary prey in New Mexico includes Steller's jays (*C. stelleri*), band-tailed pigeons (*Patagioenas fasciata*), northern flickers, spotted towhees (*Pipilo*

maculatus), sparrows (Emberizidae), bats, and cliff chipmunks (*Tamias dorsalis*) [69]. Mourning doves, broad-tailed hummingbirds (*Selasphorus platycercus*), Mexican jays (*Aphelocoma ultramarina*), bushtits (*Psaltriparus minimus*), Bewick's wrens (*Thryomanes bewickii*), great-tailed grackles (*Quiscalus mexicanus*), and spotted towhees are potential prey in the Sierra Madre Oriental [105].

At northern latitudes, prey availability may be more limited [26,82,150]. Prey in Alaska includes waterfowl, shorebirds, upland game birds (Galliformes), small to medium-sized passerines, dusky shrews (*Sorex monticolus*), voles, arctic ground squirrels, and snowshoe hares [27]. Along the Pacific coast of North America, peregrine falcons prey on marbled murrelets (*Brachyramphus marmoratus*), ancient murrelets (*Synthliboramphus antiquus*), Cassin's auklets (*Ptychoramphus aleuticus*), fork-tailed storm-petrels (*Oceanodroma furcata*), and Leach's storm-petrel (*O. leucorhoa*) [11,141]. In British Columbia, prey remains found below a nest in a Sitka spruce included rhinoceros auklets (*Cerorhinca monocerata*), Cassin's auklets, pigeon guillemots (*Cepphus columba*), fork-tailed storm-petrels, and marbled murrelets [38]. Some seabird colonies on the British Columbia coast were 60 miles (100 km) from the nest [38]. Blue jays, blackbirds (Icteridae), and swallows (Hirundinidae) were common prey species in southern Quebec [15]. In Greenland, prey is largely limited to snow buntings (*Plectrophenax nivalis*), northern wheatears (*Oenanthe oenanthe*), Lapland longspurs (*Calcarius lapponicus*), common redpolls (*Acanthis flammea*), rock ptarmigans (*Lagopus muta*), and red-necked phalaropes (*Phalaropus lobatus*) [26,82,150].

Availability and vulnerability of certain species may change throughout the year (review by [190]); both contribute to diet selection. A detailed study of seasonal diet changes was completed in Nunavut. At Rankin Inlet, peregrine falcons arrive in spring before most migratory prey. At this time, they rely heavily on resident rock ptarmigans and snow buntings. Horned larks, Lapland longspurs, and water pipits are also important early in the breeding season. Shorebirds and waterfowl became important food items after they arrive at Rankin Inlet. Due to their large size, waterfowl only became common prey after August, when females finish brooding young and are able to hunt [45]. The male does most of the hunting during incubation [144,174]. Arctic ground squirrels, collared lemmings (*Dicrostonyx groenlandicus*), and brown lemmings (*Lemmus sibiricus*) were occasionally recorded as prey throughout the breeding season [45]. Peregrine falcon breeding success increased in Rankin Inlet in years with an abundance of arctic ground squirrels, collared lemmings, and brown lemmings [44].

Detailed summaries of peregrine falcon prey by region are available in these sources: ([189], reviews by [157,190]).

Foraging behavior: The distance that peregrine falcons hunt from the eyrie may partially depend on breeding status, previous hunting success, and prey size [55]. Most peregrine falcons hunt within 9 miles (15 km) of the nest [27,61,65,120,140,191]. However, peregrine falcons often travel 15 miles (24 km) or more to hunt [61,120,173,191]. Females can carry prey a longer distance than males; thus, they may have larger hunting ranges [144]. On Langara Island, British Columbia, nesting peregrine falcons generally have small ranges, often hunting from perched positions at or near the eyrie [11]. At the opposite extreme, peregrine falcons in the forested interior of British Columbia traveled up to 60 miles (100 km) from the nest to prey on seabird colonies on the coast [38].

When searching for food, peregrine falcons primarily perch, but they also search while flying or walking on the ground (review by [190]). During the breeding season, adults may perch at a high vantage point on a cliff face, often near their eyrie, overlooking vast open space where birds may be flying. Peregrine falcons hunting while perched may try to blend in with surrounding features or partially hide in rock crevices to make surprise attacks [174]. During fall migration, an immature male hunted from perches or while in low flight before and after migratory flight each day, but rarely during migratory flight [40]. Hunting activity decreases during inclement weather with low cloud cover [48,82]. Hunting may be directed at prey toward the base of the eyrie rather than above the eyrie during periods of low cloud cover [82].

Adults usually eat away from the eyrie. Prey is either eaten where it is captured or carried to a favored perch or the nesting cliff before being consumed [144]. Eating perches included trees, rocks, or the ground, in areas with low risk of human disturbance [11,15]. Small prey (<3.5 ounces (100 g)) are usually completely consumed after decapitation and plucking [15,79,144,150,190]. Small birds can be plucked and eaten in flight [15]. Small prey can be captured farther away from plucking perches than large prey [1]. Alternately, large prey (>9 oz (250 g)) may be plucked, eviscerated, and either partially consumed on the ground or broken into large pieces that are carried to a plucking perch, eyrie, or left for later (review by [190], Cade and Hunt 2002 personal observation cited in a review by [190]). In one observation, a male peregrine falcon killed a belted kingfisher (*Megaceryle alcyon*) that was too large for the male to carry back to the nest. The female retrieved the prey [15].

Peregrine falcons cache excess intact prey, especially during the breeding season [15,129,144,174,190]. Prey captured in the early morning is cached and used periodically through the day [129,144]. Historically on Langara Island, British Columbia, peregrine falcons captured more prey than was needed and left partially consumed remains at favored eating sites [11]. This was apparently an unusual observation, because peregrine falcons typically cache excess prey for later use.

Mated pairs engage in hunting, including cooperative hunting, during courtship and after young have fledged [15,27,144]. Cooperative hunting between peregrine falcons of the same gender has also been documented [48]. Food exchanges between males and females occur during courtship [15,129]. Prey is often transferred from male to female near the eyrie, and the female primarily feeds the young. As chicks age, the adults leave food at the eyrie, and the young tear it apart and eat it [79]. Aerial transfers between adults and fledglings are also common. Fledglings may depend on their parents for food for 6 weeks or more after fledging [129].

Hunting methods: Peregrine falcons use a variety of hunting techniques including stooping from a soaring position at flying or groundlevel targets, long-distance flapping flight toward groundlevel targets; low-flying surprise attacks at groundlevel targets; low-maneuvering groundlevel flight; high direct or maneuvering flight; short-range attacks on flying targets; pursuit of flying targets; and attacks on groundlevel targets from a perched position [24,48,51,82,152,174,191]. Peregrine falcons may use terrain features or other structures to hide from prey until they are close enough to make a surprise attack ([48], Dekker 1999 cited in a review by [190]). Immature peregrine falcons may engage in long pursuits by chasing prey or repeatedly swooping at flying prey [48]. Aquatic birds may be pursued over water [51]. When hunting over open water, peregrine falcons use high-speed, low-level flights, using the waves to conceal their approach and taking swimming birds by surprise [28]. Ducks (Anatidae) may be seized on the ground, in shallow water, or just after flushing [50]. Fish are captured when they break the water's surface. When peregrine falcons are perched below potential flying prey, they may circle upwards to intercept their prey, maneuvering to keep prey flying until the prey becomes exhausted and can be grabbed in midair; or circle up until the peregrine falcon is above the prey, forcing the prey to seek cover in trees or on the ground. Peregrine falcons hunt birds and possibly small mammals on the ground by exploring vegetation with their feet, attempting to flush prey [28]. Occasionally, peregrine falcons run down invertebrates, reptiles, small mammals, and young or newly fledged birds on the ground [82,190]. Peregrine falcons hunting bats that are entering or exiting caves may use several hunting methods [159,164]. Peregrine falcons stoop at swarms of bats near the cave opening, fly into a large group of flying bats, or fly parallel to and grab bats on the edge of the swarm [159]. Young fledglings are typically not skilled enough to capture avian prey, but they often successfully capture insects on the ground and on the wing [15,28,144].

The stoop method of attack is the most common hunting tactic utilized. Peregrine falcons stoop at flocks as well as individual birds [24]. When peregrine falcons attack flocking birds, they attempt to separate individuals from the group, making the individuals more vulnerable to capture ([23], Tinbergen 1951 cited in a review by [190]). When stooping, a perched peregrine falcon flies above prey and dives after a suitable height is reached [144]. Stoops may originate from 160 to > 4,900 feet (50-1,500 m) above an intended target, with a dive of up to 3,540 feet (1,080 m) [2,24,158]. Diving peregrine falcons reach may velocities of 56 to 250 mph (90-400 kph) [28,73,108,144,175]. However, diving speeds of 69 to 87 mph (112-140 kph) or less may be more typical [2]. Peregrine falcons may pull out of a dive to grab or strike prey, or repeatedly dive to force prey into water or on open ground where it can be grabbed [28,152]. Prey is often killed and eaten in flight [144,159,190]. Multiple accounts of successful and unsuccessful hunting attempts are summarized in these sources: [48,152].

Hunting success depends on many factors including age of the individual, breeding status, hunger level [15,149], hunting determination, weather, prey abundance, achievement of surprise, time of day, season, prey species, and prey behavior [48,51]. Depending on these factors, hunting success rates can range from 7.3% to 83.2% [15,149,152,174,190]. In western Washington, peregrine falcons hunting dunlins (*Calidris alpina*) in winter had a success rate of 47% in estuaries and 12.5% on coastal beaches [23,24]. An adult male had hunting success rates ranging from 73% to 100% on open coastal marshes [28]. Adults are significantly more successful during the breeding season than outside the breeding season (34.9% and 12.7%, respectively, $P<0.001$). Outside the breeding season, adults have significantly higher hunting success than immatures (12.7% and 7.3%, respectively, $P<0.001$) (review by [149]). Peregrine falcons that are highly motivated are more successful at hunting than less motivated peregrine falcons. Motivation was determined by the perceived intensity of hunting efforts [174].

PREDATORS:
After fledging, peregrine falcons are largely safe from predation [132]. Adults are typically only killed by large avian predators such as eagles, gyrfalcons, and great horned owls (review by [190]). Peregrine falcons are occasionally killed during territorial fights [45]. Rare accounts of remains of adult peregrine falcons at eyries have been noted (Peters 1993 personal communication, Morgan 1993 personal communication, and Bell 1993 personal communication cited in [144]).

Predators of young peregrine falcons include adult peregrine falcons, great horned owls, red-tailed hawks, and osprey [8,190]. Red fox (*Vulpes vulpes*) and gray wolf (*Canis lupus*) predation has been observed in Alaska [27]. Bears (*Ursus* spp.), wolves (*Canis* spp.), foxes (*Vulpes* and *Urocyon* spp.), wolverines (*Gulo gulo*), short-tailed weasels (*Mustela erminea*), wild cats (*Lynx* spp.), ground squirrels, and golden eagles may prey on peregrine falcon eggs and young nestlings at easily accessible nests [27,190]. Northern raccoon (*Procyon lotor*) predation is documented rarely [80,171]. Peregrine falcons nesting on low cliffs or the ground are more aggressive towards carnivorous mammals than those nesting on high cliffs (review by [190]). Peregrine falcons may stoop at potential predators to scare them off [79]. High cliffs in inland western Greenland protect young peregrine falcons from predation by arctic foxes (*V. lagopus*) and possibly polar bears (*U. maritimus*) [26]. Great horned owls [9,171], golden eagles, and other peregrine falcons [171] are the principal predators during reintroductions ([16] cited in a review by [190]).

Male peregrine falcons may attack their own fledglings. Injuries suffered by the fledglings during these attacks may be fatal [183]. Instances of peregrine falcons eating their offspring apparently occurred after the nestlings died from an unrelated cause (Mearns 1993 personal communication, Horne 1993 personal communication, and Treleaven 1993 personal communication cited by [144]).

FEDERAL LEGAL STATUS:
Species-level status:
None [178]

Subspecies status:
American peregrine falcon: Recovery
arctic peregrine falcon: Recovery [179]

In 1999, the US Fish and Wildlife Service issued a final ruling to remove the peregrine falcon from the Federal List of Endangered and Threatened Wildlife, thereby removing all federal protections under the Endangered Species Act [121].

OTHER STATUS:
Although delisted from its federal status as an endangered species, legal protections provided under the Migratory Bird Treaty Act, the Convention of International Trade in Endangered Species of Wild Fauna and Flora, and state laws still apply [121]. Information on state- and province-level protection status of animals in the United States and Canada is available at NatureServe, although recent changes in status may not be included.

MANAGEMENT CONSIDERATIONS:
From the 1950s to the mid-1970s, global peregrine falcon population declines resulted from eggshell thinning and embryo mortality due to use of organochlorine pesticides, particularly DDT and DDE, in agriculture and forestry [101,134,137,190]. No known breeding pairs were present in the eastern United States by the mid-1960s [9]. Adult mortality during the same time period was linked to the insecticides aldrin and dieldrin [134]. Risebrough and Peakall [148] concluded that dieldrin played a more substantial role in peregrine falcon decline in Britain than it did in North America. In the 1970s, peregrine falcons were placed on the Federal List of Endangered and Threatened Wildlife (review by [190]).

Recovery of peregrine falcon populations began after DDT and similar pesticides were banned in 1972 [137]. Intensive reintroduction efforts began throughout the United States and elsewhere to promote population recoveries [9,32,55]. Populations in North America were increasing at a rate of 2.9% to 25% per year between 1974 and 2000, partially due to reintroduction efforts [30,46,64,151]. Nesting sites in Alaska, Canada, and Greenland were increasingly occupied between 1980 and 1985 compared to previous decades, with some nesting territories consistently used from year to year [4,17,21,22,67,116,125]. Nesting success was higher in western Mexico from

1976 to 1985 compared to 1968 to 1974 [139]. These findings demonstrate the recovery of peregrine falcons in those areas. By 1999, populations within the United States had recovered sufficiently to prompt the US Fish and Wildlife Service to delist the peregrine falcon [121]. Despite recovery efforts in the United States, peregrine falcons migrating to Central and South America or areas where DDT or similar pesticides are still used may continue to accumulate pesticide residues [85].

Disturbances that may have contributed to the peregrine falcon decline include destruction of wetlands, construction of roads and other structures, poaching, removal of eggs and nestlings from nests, disturbance from recreational activities, and climate change [101]. Because peregrine falcons use a wide range of habitats and landscapes, the effects of habitat degradation are difficult to assess. The greatest effects are likely due to losses of nesting sites, which may be limited. Migrating and wintering peregrine falcons are often attracted to wetlands where shorebirds and waterfowl are abundant. Loss of wetlands would be detrimental for peregrine falcons that winter in these areas. Peregrine falcon response to agricultural development is variable. Because agricultural practices attract potential prey, peregrine falcons may benefit from agriculture (review by [190]). In contradiction, Young [198] asserted that peregrine falcons may decline as a result of agricultural development because peregrine falcons frequently utilize undisturbed riparian areas, forests, or other undisturbed habitats. Peregrine falcon response to agricultural activities likely depends on the level of human disturbance and prey availability [198].

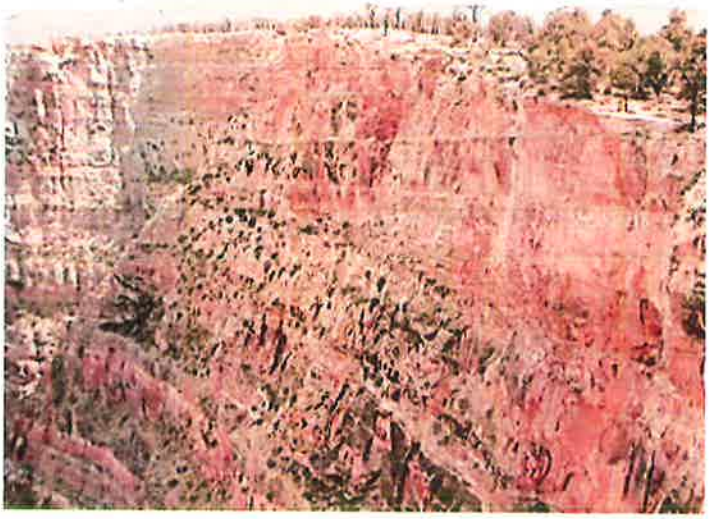
Human disturbance may disrupt the reproductive behavior of peregrine falcons [57,86]. Rock climbing and other recreational activities pose a threat to peregrine falcons [144]. The Peregrine Falcon Recovery Plan, produced by the US Fish and Wildlife Service, discourages any land use practices that may disturb the habitat or prey base of peregrine falcons within a 10-mile (16 km) radius of an active nest [117]. Sonic booms may distress peregrine falcons. At an eyrie on the Los Padres National Forest, California, 2 adult peregrine falcons responded to a sonic boom by flying around and "screaming" for a short period [79]. However, effects of jet overflights on nesting behavior were minimal in Alaska [136]. Ellis [57] recommended that recreational activities and human development be minimized whenever peregrine falcons occupy an area. Stephenson and Calcarone [165] concluded that protecting nesting sites from human disturbance is critical for peregrine falcon conservation.

Timing of disturbance of nest sites seems critical [144]. Nesting peregrine falcons are intolerant of excessive human disturbance; they may abandon a nesting site during courtship and move to another ledge or cliff if possible. Breeding pairs may attempt to continue nesting if eggs or nestlings are being brooded [144,173], but often, the nest is deserted [144]. Desertion of an eyrie with eggs usually only occurs after frequent or prolonged disturbance that keeps the adults from incubating eggs for long periods of time [144,187,192]. Peregrine falcon young can perish in harsh environments if the parents, panicked by human disturbance, are away from the nest for long periods [187]. Peregrine falcons nest successfully in cities and other areas with high human activity if humans do not interfere with or harass the peregrine falcons [144].

Additional details on the reintroduction, recovery, and management of peregrine falcons in North America can be found in chapters 51 to 57 of Cade and others [31].

FIRE EFFECTS AND MANAGEMENT

SPECIES: Falco peregrinus



Peregrine falcon eyrie shortly after the Bear Fire in Dinosaur National Monument was extinguished. Three nestlings successfully fledged. Photo by John Skinner, US National Park Service.

DIRECT FIRE EFFECTS:
Due to their high mobility, fire-related mortality of adult raptors is likely low. Nestling mortality is potentially higher because nestlings are unable to flee approaching fire [110]. However, since peregrine falcons nest on cliff faces, rock outcrops, and similar sites, the potential for damage to the nesting site or nestling mortality is low but possible [71] if vegetation on the nest ledge catches fire. Fire may threaten peregrine falcon nests at ground level amongst dense vegetation [144].

Spring fires may disturb peregrine falcon nesting [36]. Fire fighting activities, such as helitack operations, vehicles, construction of fire breaks, fire crew camps, and retardant drops, could disturb peregrine falcons during the nesting season and affect nesting success [71,123]. However, negative effects of fire fighting activity were not observed at an eyrie in Colorado (Welch 2008 personal communication [181]). In Arizona, management recommendations include restricting prescribed fire within 1 mile (0.6 km) of cliffs with occupied eyries and within 2 miles (3 km) from the base of cliffs with occupied eyries [57]. In cliff habitats, spring burning (mid-April to late June) may disturb nestlings if the fires are adjacent to occupied cliffs [36].

Observations of an eyrie in Dinosaur National Monument, Colorado, showed that peregrine falcons can successfully fledge even if a wildfire is active on top of the cliff (see photo above). The Bear Fire, which started on 27 June 2002 and was contained on or about 7 July 2002, burned the area immediately surrounding the eyrie. Three young successfully fledged while the fire was still active. Fire crews and helicopters in the immediate vicinity seemed to have no adverse effects on the reproductive habits of the parents. Helmet sketches (drawings of the head coloration for each bird) indicate that this was the same pair that occupied the territory the previous year. The territory had been occupied regularly by peregrine falcon pairs that successfully fledged young without failure since at least 1997 (Welch 2008 personal communication [181]).

Peregrine falcons in California have been observed feeding in burned areas zero to >10 years after a fire [36]. Similarly, peregrine falcons were observed hovering and flying over smoking meadows along fire perimeters during the 1988 wildfires in Yellowstone National Park, Wyoming [76].

INDIRECT FIRE EFFECTS:

- Habitat
- Associated species

Habitat: Wetlands in eastern Alaska support a large variety of wildlife [192] and may provide a large prey base for peregrine falcons. Fire maintains many marshes in northern regions. Periodic fires maintain marshes by preventing encroachment of woody vegetation and burning dry matted grasses. Wetland productivity decreased in eastern Alaska as a result of fire exclusion, although the importance of the decrease is unknown [192].

Many open areas in mountainous regions are maintained by fire and logging [163]. Peregrine falcons occur in habitats such as pinyon-juniper, ponderosa pine, Douglas-fir, fir-spruce, redwood, and sequoia forests [110]. These plant communities are considered fire-dependent [196]. Historically, fire in pinyon-juniper habitat occurred at 10- to 30-year intervals. Fire-return intervals for ponderosa pine habitat average every 5 to 10 years, with regional variability. Historically, "high-intensity", stand-replacing fires in Douglas-fir habitats in the Pacific Northwest occurred every 100 to 500 years. In the absence of fire, Douglas-fir is replaced successionally by western hemlock (*Tsuga heterophylla*), western redcedar (*Thuja plicata*), and/or firs. Where spruce and fir-spruce forests occur, fog and summer rains typically keep the understory damp, often preventing fires from spreading. During periods of drought, fir-spruce forests may experience "intense" fires. In redwood and giant sequoia forests, "low-intensity" fires occur on mesic sites from 200- to 500-year intervals. Giant sequoia do not sprout after fire and require seed to reestablish [110].

Although not specified by Mitchell [123], peregrine falcons likely inhabit the Navajo sandstone cliffs that dominate the canyon walls of Zion National Park, Utah (see Cover requirements). Between 1751 and 1980, average fire-return intervals in Zion National Park were 1.3 to 2.7 years on a high-elevation plateau. Plateau cover includes ponderosa pine forests and Gambel oak woodlands. Elevations of the plateaus are 6,500 to 7,800 feet (1,980-2,380 m) [114]. Average fire-return intervals in Zion National Park were historically infrequent at low elevations ([123],[184] cited by [123]). Cliff vegetation at Zion National Park consists of isolated ponderosa pine, mountain-mahogany, manzanita (*Arctostaphylos* spp.), and other vegetation growing in cracks in the bedrock. Cliffs are occasionally affected by lightning-ignited wildfires. However, cliff vegetation usually grows is isolated patches, preventing fires from spreading [123]. Peregrine falcons also utilize pinyon-juniper woodlands and ponderosa pine forests in southern Utah [193] and likely use these habitats within Zion National Park as well. West and Loope ([184] cited in [123]) determined that the average fire-return interval for pinyon-juniper woodlands in Zion National Park was 160 years.

Associated species: Indirect effects of fire on prey populations influences the long-term effects of fire on peregrine falcons [71]. Because fire can promote an increase in vegetation and bird diversity, a "let-burn" policy is recommended by Whitacre [185]. Mosaic burn patterns observed in Yellowstone National Park after the 1988 fire season resulted in an increase in vegetative diversity, which promotes bird diversity and abundance [178]. In California, avian prey could increase following a fire if their food supply increases [36]. Increases in avian prey species after fire may benefit peregrine falcons in the area.

Immediately following a prescribed fire in an oak/ceanothus (*Ceanothus* spp.) chaparral community in the southern Sierra Nevada foothills, avian and mammalian prey became more vulnerable to predation due to the lack of cover. Increased prey vulnerability was advantageous to birds of prey in the area. These effects declined within 3 postfire years [107].

Bird and mammal diversity decreases in mature chaparral (≥10 years) [113]. Therefore, frequent fires in chaparral habitats would likely promote a diverse prey base, which could benefit peregrine falcons. However, spring and summer fires in chaparral and surrounding communities may destroy bird nests on the ground or in shrubs. Fires during this time could reduce the potential prey availability for peregrine falcons. A mosaic of unburned patches and small burned areas surrounded by mature chaparral may support a large variety of bird species [36].

In Southwest desert ecosystems, wildfires and prescribed fires benefit potential prey species--------such as scaled quail (*Callipepla squamata*), horned larks, white-winged doves (*Z. asiatica*), mourning doves, broad-tailed hummingbirds, Lewis's woodpeckers (*Melanerpes lewis*), ladder-backed woodpeckers (*Picoides scalaris*), hairy woodpeckers (*P. villosus*), northern flickers, western wood-pewees (*Contopus sordidulus*), Steller's jays, house wrens (*Troglodytes aedon*), western bluebirds (*Sialia mexicana*), American robins, western tanagers (*Piranga ludoviciana*), green-tailed towhees (*P. chlorurus*), spotted towhees, chipping sparrows (*Spizella passerinea*), vesper sparrows (*Pooecetes gramineus*), lark sparrows (*Chondestes grammacus*), savannah sparrows (*Passerculus sandwichensis*), white-crowned sparrows (*Zonotrichia leucophrys*), eastern meadowlarks (*Sturnella magna*),

western meadowlarks (*S. neglecta*), and house finches (*Carpodacus mexicanus*)------for 1 to 20 postfire years. Other bird species have neutral or negative responses to fire [19]. Twenty-five years after fire, potential prey populations in an area of New Mexico are highly diverse and abundant [69]. Due to their varied diet, peregrine falcons in the Southwest may benefit from a landscape mosaic that maximizes prey availability near their eyries.

Responses of many avian species may be mixed, depending on fire severity. Cavity-nesting birds in the Intermountain West, such as woodpeckers (Picinae), western wood-pewees, and bluebirds (*Sialia* spp.), generally respond favorably to fire in ponderosa pine, lodgepole pine, fir-spruce, and mixed-conifer forests. On the other hand, gleaners, such as nuthatches (*Sitta* spp.), vireos (*Vireo* spp.), and chickadees (*Poecile* spp.), generally have negative postfire responses or maintain low population densities after fire in these habitats [154].

FIRE REGIMES:
Find further fire regime information for the plant communities in which this species may occur by entering the species name in the FEIS home page under "Find Fire Regimes".

FIRE MANAGEMENT CONSIDERATIONS:
In a review, Bull and Wales [25] determined that the primary impact of disturbance on peregrine falcons depends on how disturbance affects their prey. Peregrine falcons primarily nest on cliffs or man-made structures in relatively open habitat, so the direct effect of fire on their nesting habitat is likely minimal. Indirectly, tree mortality associated with fire, insects, and disease may affect the peregrine falcon's prey base [25]. To protect and promote the diversity of avian prey, maintaining riparian and aquatic habitat near active eyries may benefit the peregrine falcon.

Human disturbance at nest sites can be detrimental to reproductive success (see Management Considerations). Thus, limiting disturbance near active nest sites may promote peregrine falcon populations. The response of peregrine falcons toward fire and fire-fighting activities is mixed. In Arizona and California, guidelines suggest limiting fire activity near an active eyrie until nestlings have fledged [36,57]. However, detrimental effects from fire and fire-fighting activities were not observed in Colorado (Welch 2008 personal communication [181]). These observations suggest that the response of breeding peregrine falcons to fire activity near the eyrie may be influenced by the severity of disturbance and the reproductive stage of the pair.

Peregrine falcons occur in virtually every habitat in North America, including metropolitan areas. Vegetative community and structure appear to have little influence on habitat suitability for nesting or foraging (see Preferred Habitat). However, prey abundance and availability are influenced by the effects of fire and other disturbances on habitat. Maintaining a landscape of mixed habitat could promote prey diversity, thereby benefiting peregrine falcons.

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